Real Time Vehicle Tracking and Speed Checking System Based On IoT

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ABSTRACT: In this paper web based GPS-GPRS vehicle tracking system was designed and implemented. The current position of the vehicle was acquired by GPS device which is integrated to the target vehicle and the location coordinates are sent through GPRS service provided by the GSM network. The GPS receiver is used to give latitude and longitude of the current location. The proposed system is built using the microcontroller. This is the heart of the device. This GPS receiver is interfaced with microcontroller through the serial port and used to obtain the current location. The GPS receiver acquires the present position of the location and sends the same acquired values to GPRS through another com port, to display the exact location on Google map. As we know that over speeding is one of the major causes for accidents, there is a need to acknowledge the importance of a strict speed limit enforcement system which does not require to be handled manually; The Speed Check and Over speed Detector is one of the required systems. This can also be implemented in school campuses, college campuses and other buildings. It detects the presence of over speeding vehicle and captures its image (image of the number plate) and sends it to drop box using cloud computing or as a mail to authority server.

Keywords: GPS, GPRS, Vehicle Tracking

I. INTRODUCTION

Tracking and monitoring vehicle are coming vastly utilized based on Global Positioning System (GPS). In this paper a real time tracking system is proposed. The proposed framework would make great utilization of new innovation that basis on embedded board denotation Arduino Intel Galileo. This system acts on Global System for Mobile Communication (GSM), Global Positioning System (GPS) and General Packet Radio System (GPRS) which are utilized for vehicle tracking and monitoring. The SIM800L Module is applied which incorporates three technic to be specific GPS, GPRS and GSM. GPS gives the vehicle location coordinates, GPRS transmits these data to the server and finally the GSM transmits warning message to the vehicle owner phone. This project exhibits the evolution of the vehicle tracking system prototype which is used in the vehicle. In particular, the framework will use GPS to acquire a vehicle location coordinates and send it utilizing GSM modem to the owner phone and to the web server. After that, the browser can load the PHP webpage which uses Google maps to show the location in a real-time. To define the location accuracy of the suggested system, we compared the system proposed results with the different commercial GPS devices.

With the advancements in technology, automated vehicle tracking systems (VTS) have become very prominent. The implementation details of a VTS that can display the vehicle position on Google maps, is presented in this project. The GPS, GSM/GPRS modules controlled by a Arduino microcontroller are placed inside the vehicle. The vehicle position obtained from the GPS module is sent to a remote web server using GSM.

The Arduino microcontroller board is used as a web server and it displays received vehicle coordinates on the Google maps. The vehicle position is updated every 10sec as the vehicle is moving and tracking. Google maps API is used to locate the vehicle in a map using the smart phone application. Developed a web application using PHP and MySQL for GPS tracking using low-priced mobile phones. The system proposed in this paper helps in monitoring the vehicle location from anywhere in the world through the IOT based web server. Displaying the coordinates on Google maps enables the users to understand the location of vehicle easily.

II. BLOCK DIAGRAM:

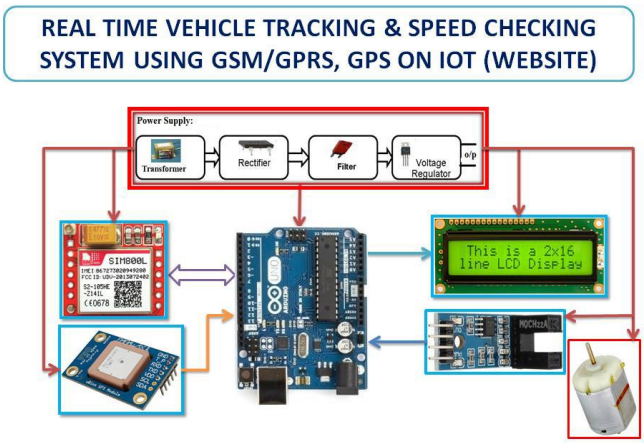

Figure 1: Block Diagram of Project

A. Arduino Uno:

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

B. GSM/GPRS Module:

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system**.** Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.
General Packet Radio Service (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM). GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP).

C. GPS module:

GPS receivers receive almanac data from the satellite and also calculate their position by calculating its distance from then visible satellites and then by using triangulation method to calculate its position. After the data has been received and position has been calculated, the data is configured according to standards set up by **NMEA** (**National Marine Electronics Association**) and is serially transmitted at a baud rate of 4800 bps. The National Marine Electronics Association (**NMEA**) has developed standards that describe the interface between various marine electronic equipment's. The standards allow marine electronics to send information to computers and to other marine equipment's.

D. 16x2 LED Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LCDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

E. DC Motor

A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

F. LM393 Speed Sensor

This IR speed module sensor with the comparator LM393, we can calculate the speed of rotation of the wheels of our motor. If we place a ring gear that rotates attached to our wheel. It could also be used as an optical switch.

III. LITERATURE SURVEY

Real-time tracking and management of vehicle has been a field of interest for many

researchers and a lot of research work has been done for tracking system. Recently the various anti-theft modules like steering wheel locked equipment, network tracking system and traditional electronic alarm are developed along with client identification and real time performance monitoring. The paper presented by describes a real time tracking system that provides accurate localizations of the tracked vehicle with low cost. GSM SIM800L cellular quad band module is used for implementation. A monitoring server and a graphical user interface on a website is also developed using Microsoft SQL Server 2003 and ASP.net to view the proper location of a vehicle on a specific map. The paper also provides information regarding the vehicle status such as speed, mileage.

IV. PROPOSED VEHICLE TRACKING SYSTEM

The proposed vehicle tracking system consists of a tracking server to monitor and control the system, web interface to check vehicles' location and number of in-vehicle units with embedded GPS receivers that have been installed inside each vehicle as illustrated in figure 1. The in-vehicle units are responsible for capturing the location data continuously and store this information in an internal database. These data is then sent to the tracking server periodically. The time interval of data transmission depends on the preferred operation cost and the in-vehicle unit reliability. The proposed system displays a real-time vehicle tracking system utilizing a client/server pattern. The customer or client contains an embedded equipment integrate with GPS/GPRS device to determine the module position information that is periodically sent to the server. The server side consists of a personal computer together with web server software.

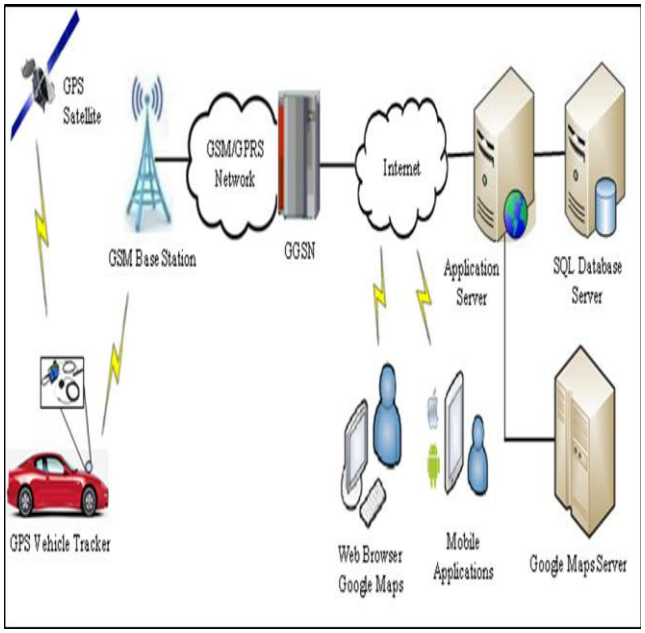

Figure 2: Block Diagram of Proposed Vehicle Tracking System

This position data modified into the style that can be shown by utilizing Google Map innovation. The proposed real-time tracking system architecture is shown in figure 1. The rest of the paper has been organized as follow: after introduction at section 1, the proposed system architecture has been provided in section 2. Section 3, displays the results and discussions with some screen shots of proposed system. Finally, section 4 shows the conclusions of the paper and the future work.

V. RESULTS AND DISCUSSIONS

1. Web Browser Screenshot:

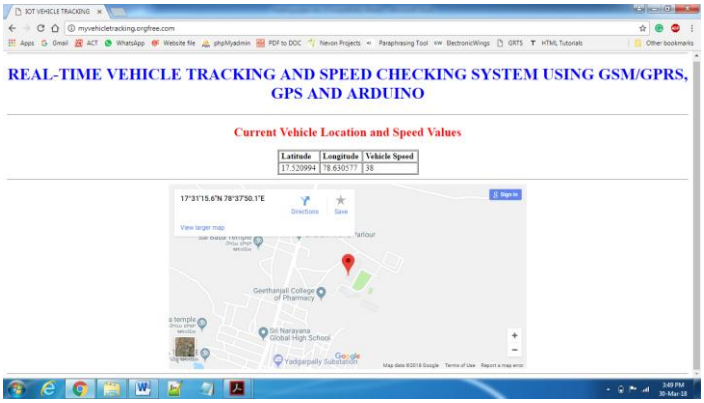

Figure 3: Webpage output

2. Project Kit Pictures:

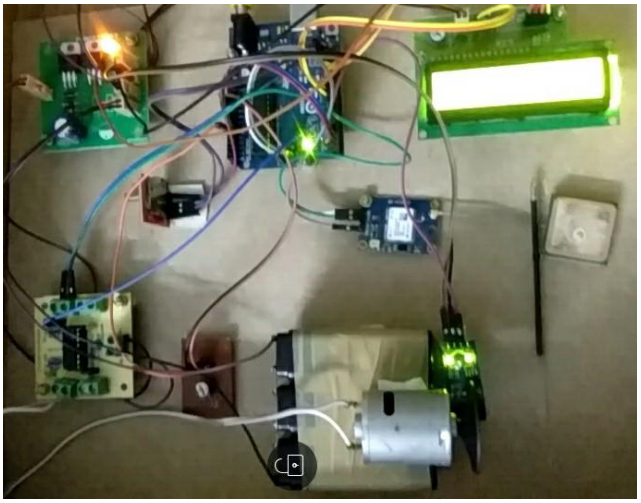

Figure 4: Project Kit

VI. CONCLUSIONS AND FUTURE SCOPE

This paper proposed an efficient real time vehicle tracking and monitoring system. The proposed system has been effectively designed and implemented of vehicle tracking based on GPS technology. The device inside the vehicle is collected of embedded board Arduino Intel Galileo and SIM908 Module that include GPS/GPRS/GSM services. The system received GPS signals and transmitted the data to the WEBPAGE. The vehicle's geographic coordinates from the VTD are stored in a MySQL database. The vehicle's GPS coordinates are updated for every 60 seconds in the server and the corresponding location is shown on Google maps. Also these data has been sent to the vehicle owner as SMS. In the case of vehicle theft, the suggested system gives the vehicle location information include latitude, longitude, altitude, date, satellites, speed OTG and course.

This implementation can be extended for tracking of multiple vehicles at the same time. An android application could be developed to show the vehicle location in a smart phone. Also, a subscription system could be developed to send alerts to subscribers, when vehicle is at a certain distance or time from the user location.

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